

C L A I M S

5 1. - Procedure of rapid cooling of packaged beverages which comprises the spraying of a coolant liquid, preferably brine, which will cover the greater part of the surface of the container in rotation during a time calculated from the initial and desired temperatures, the temperatures of the cold solution and of the rinsing water, the duration of the rinsing and the temporal coefficient of the packaged beverage.

10 2. - Procedure of rapid cooling of packaged beverages according to claim 1 characterized in that if the temporal coefficient of the packaged beverage is unknown when beginning the process, it will be calculated carrying out the spraying during a preset time, stopping the spraying, but not the rotation of the container, and taking at least three readings of the temperature of the surface of the container at different times, the equilibrium temperature of the container and the beverage being calculated, and from this last figure, from the initial one, from that of the cooling liquid and from the duration of the spraying applied the temporal coefficient is deduced, calculating thereafter the remaining cooling time and the spraying being continued until concluding the cooling.

15 3. - Procedure of rapid cooling of packaged beverages according to claims 1 and 2 characterized in that the initial, cold solution and rinsing water temperatures are detected by thermal sensors and their values transferred to the CPU, the desired final temperature is introduced manually and the duration of the rinsing is a preset value.

20 4. - Procedure of rapid cooling of beverages packaged according to claims 1, 2 and 3 characterized in that if the desired final temperature is less than 0° C the system will request the alcoholic content of the beverage to check the compatibility of the desired temperature with non-freezing and if the calculation indicates that freezing will take place the system will request the final temperature be modified or the alcoholic content changed.

25 35 5. - Procedure of rapid cooling of packaged beverages according to

claims 2 to 4 characterized in that if desired by the user the values of the final temperature, of the alcoholic content and of the temporal coefficient of the cooled packaged beverage are stored in a database in the memory of the CPU to obviate having to reintroduce or recalculate them whereby there will be no need for stoppages according to claim 2 when the cooling of a stored beverage is repeated, it being sufficient to simply introduce the code assigned to it.

6. - Procedure of rapid cooling of packaged beverages according to claims 1 to 5 characterized in that the values corresponding to the last beverage are stored in a position without needing to assign a code thereto and permitting the use of its data in a simple manner for the following beverage.

7. - Procedure of rapid cooling of packaged beverages according to claims 5 and 6 characterized in that when cooling a beverage whose data are stored it is possible to modify only the desired final temperature, storing or not the new value as decided by the user, the change of the final temperature not implying a new calculation of the temporal constant.

8. - Procedure of rapid cooling of packaged beverages according to claim 2 characterized in that to achieve greater precision another stoppage will be made before reaching the end of cooling time, the temporal coefficient being recalculated again, following for this the process indicated in claim 2.

9. - Procedure of rapid cooling of packaged beverages according to claims 2 and 8 characterized in that in the stoppages, the microprocessor will take temperature readings in a continuous manner with a preset time interval using an IR sensor on the outer wall of the container and it will calculate at three preset times the mean temperature of the last n readings received up to each time and with the three mean temperatures obtained it will calculate the equilibrium temperature of the beverage and its container in the stoppage, which will be applied for calculating the temporal coefficient.

10. - Procedure of rapid cooling of packaged beverages according to

claim 1 consisting in the timed spraying of a cooling liquid on containers of beverages to be chilled characterized in that it comprises the following phases:

- 5 ◦ Storing and cooling of the brine in a reservoir receptacle at a temperature between 0° C and –50° C,
- Placement of at least one beverage container on a cooling tray,
- Rotation of the container about its own axis,
- Calculation of the spraying time,
- 10 ◦ Spraying brine on the container during at least one phase at a temperature below 0° C for the previously calculated time,
- Stopping the spraying of the brine on the container,
- Spraying of rinsing water on the cooled container for the removal of the brine during a preset time,
- 15 ◦ Stopping the rotation of the container and of the spraying of rinsing water,
- Withdrawal of the cooled beverage container.

20 11. - Procedure of rapid cooling of packaged beverages according to claim 10 characterized in that the brine is sprayed in such a way that the same glides on the container of the beverage to be cooled so that it coats the greater part of its surface including the lowest part at all times in the cooling.

25 12. - Procedure of rapid cooling of packaged beverages according to claim 10 characterized in that the container rotates about itself in a single direction.

30 13. - Procedure of rapid cooling of packaged beverages according to claim 10 characterized in that the rotation of the container about itself is done in alternating directions producing an appropriate level of turbulence inside the actual container without negatively affecting its contents.

35 14. - Procedure of rapid cooling of packaged beverages according to claims 10 to 13 characterized in that the spraying of the brine on the beverage container to be cooled is carried out by a single jet which delivers

the sufficient flow of brine for cooling the container and with this the beverage packaged in the same.

5 15. - Procedure of rapid cooling of packaged beverages according to claim 10 characterized in that the spraying of the brine is carried out by means of multiple distributed jets on the surface of the container to be cooled.

10 16. - Procedure of rapid cooling of packaged beverages according to claims 14 and 15 characterized in that the single or the multiple jets are located on the vertical plane which passes through the axis of the container to be cooled.

15 17. - Procedure of rapid cooling of packaged beverages, according to claim 10 characterized in that the rinsing water is sprayed at ambient temperature or temperature of the supply system.

20 18. - Procedure of rapid cooling of packaged beverages, according to claims 10 and 17 characterized in that the rinsing water is cooled prior to being sprayed on the container to be rinsed.

25 19. - Procedure of rapid cooling of beverages packaged according to claims 1 to 10 characterized in that the microprocessor uses the following values for the calculations:

Preset values which are:

Kbase auxiliary temporal coefficient used for calculating the duration of the first spray phase.

30 Time between acquisition of temperature readings from the IR sensor during the stoppages

n number of readings in a burst

Time between the calculations of the three mean temperatures of n readings during the stoppages

Fixed time for non-presence of drips

35 Fixed time to empty brine from the enclosure and clear the

discharge pipe including the three-way valve
Duration of the rinsing spray
Predefined value of final temperature
Predefined alcoholic content equal to zero.

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Variable values which are:

Desired final temperature for the beverage
Initial temperature of the beverage acquired with IR sensor
Surface temperatures of the container acquired with IR sensor
Temperature of the brine acquired with sensor
Temperature of the rinsing water acquired with sensor
Alcoholic content of the beverage if the same were different
from 0
Temporal coefficient.

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20. - Procedure of rapid cooling of packaged beverages according to claims 1 to 3, 5 to 9, 11 to 16 and 19 characterized in that by substituting the cooling liquid, usually brine, with hot liquid, which normally will be water at 80° to 90° C, the heating instead of the cooling of the packaged beverage is achieved.

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21. - Procedure of rapid cooling of beverages according claim 1 characterized in that the time of spraying the brine, as well as the rotation or not of the container is set in a manual manner.

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22. - Procedure of rapid cooling of beverages according to claims 1 and 21, characterized in that the spraying of the brine causes, depending on its duration the partial or total freezing of the beverage on which the brine is sprayed.

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23. - Procedure of rapid cooling of beverages according to claim 22, characterized in that by rotating the container during the spraying of the brine the freezing is produced starting from the wall of the container and ending on the axis of the same.

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5 24. - Rapid cooling of packaged beverages characterised in that it incorporates a coolant liquid reservoir (29) from which liquid is fed after the activation of a solenoid valve (39) through an outlet pipe (6) connected to a distribution pipe (1) from which the coolant liquid is sprayed on the one or more containers to be cooled so that when sprayed said cooling liquid is recovered through a return pipe (7) to the coolant liquid reservoir (29), this coolant liquid reservoir having coupled thereto a cold producing equipment.

10 25. - Rapid cooling apparatus of packaged beverages according to claim 24, characterized in that the containers to be cooled are supported on integral projections (3) of two parallel axles (12) which are distributed uniformly rotating the container by the action of those projections (3) activated by at least one motor (11) linked to at least one of the axles (12), the projections (3) being separated from said axles (12) by sufficient space to allow the flow of the brine through said space achieving that the brine wets the entirety of the surface of the container.

15 26. - Rapid cooling apparatus of packaged beverages according to claim 25, characterized in that the axle (12) consists of a worm screw.

20 27. - Rapid cooling apparatus of packaged beverages according to claim 26 characterized in that the worm screw is divided into two threads in opposing directions.

25 28. - Rapid cooling apparatus of packaged beverages according to claims 26 and 27 characterized in that the worm screw is rounded in profile.

30 29. - Rapid cooling apparatus of packaged beverages according to claim 24, characterized in that the distribution pipe (1) has at least one orifice or outlet which delivers a sufficient flow rate of brine for cooling the packaged beverage covering most of the surface of the container.

35 30. - Rapid cooling apparatus of packaged beverages according to claims 24 and 29, characterized in that the distribution pipe (1) has several orifices (82) or outlets made on the bottom from which issue jets (10) of

cooling liquid sprayed on the containers.

5 31. - Rapid cooling apparatus of packaged beverages according to claim 29 and 30, characterized in that the orifice or orifices (82) or outlets are located in a vertical plane proximate or coincident with the vertical plane which passes through the axis of the container.

10 32. - Rapid cooling apparatus of packaged beverages, according to claim 24, characterized in that it incorporates an auxiliary tank (23) which contains cooling liquid (22) and which is mounted above to the reservoir receptacle of cooling liquid (29) to which it is connected through an auxiliary pipe with inclusion of a stopcock (24) to fill the cooling liquid receptacle (29) automatically as losses take place.

15 33. - Rapid cooling apparatus of packaged beverages, according to claim 24, characterized in that the reservoir receptacle of cooling liquid (29) incorporates an overflow tube (66) which maintains the level of the brine, discharging the excess toward the drainage channel.

20 34. - Rapid cooling apparatus of packaged beverages, according to claims 24 to 33, characterized in that it incorporates a pipe of rinsing water (2) in which is a solenoid valve (37) which is activated when the operation of cooling the container has concluded to open passage for the water which washes the container and removes the remains of cooling liquid from its surface, the water being discharged through a rinsing water drainage pipe (9).

25 35. - Rapid cooling apparatus of packaged beverages according to claims 24 to 34, characterized in that the rinsing water pipe (2) ends proximate to the brine pipe (6) over the distribution pipe (1) from which the jets of water are sprayed toward the container (4-5-17).

30 36. - Rapid cooling apparatus of packaged beverages according to claims 24 to 35, characterized in that the drainage discharges on a drainage filter (39) passing the liquid removed through a three-way valve (8) which

selects the passing of liquid toward the rinsing drainage pipe (9) or toward the brine return pipe (7).

5 37. - Rapid cooling apparatus of packaged beverages according to claims 24 to 36, characterized in that the cooling liquid receptacle (29) is located underneath the tray, in which case the apparatus incorporates a pump (31) activated by a motor (25) for driving the brine through the brine pipe (6) toward the distribution pipe (1) for its subsequent spraying on the containers (4-5 - 17).

10 38. - Rapid cooling apparatus of packaged beverages according to claims 24 to 37 characterized in that the cooling liquid receptacle (29) is located above the tray, in which case the brine falls by gravitational effect on the containers to be chilled, the apparatus incorporating a pump (31) activated by a motor (25) for return of the brine through the brine pipe (6) toward the receptacle of the cooling liquid (29).

20 39. - Rapid cooling of beverages packaged according to claims 24 to 38 characterized in that it incorporates several trays parallel to those which are accessed from above, incorporating in each of the trays a distribution pipe (1) on which ends its corresponding brine pipe (6) and rinsing water pipe (2), and also it comprises corresponding drainage pipes with three-way valves (8) connected to the rinsing drainage pipes (9) and to the return pipes (7) in correspondence with each tray, it having been foreseen that the pipes described are assembled in corresponding main ducts.

25 40. - Rapid cooling apparatus of packaged beverages according to claims 24 to 39, characterized in that from the main duct from which the coolant pipes (6) leave, an auxiliary duct (19) runs connected to a pressure control valve (49) which discharges the brine impelled by the pump (31) toward to the receptacle (29) if a certain value of pressure is surpassed in said duct.

30 41. - Rapid cooling apparatus of packaged beverages according to claims 24 to 40, characterized in that it incorporates an integral refrigeration

unit (43).

5 42. - Rapid cooling apparatus of packaged beverages according to claim 39, characterized in that it incorporates a folding protection (50) hinged on an axle (57) which covers the trays and the containers to avoid splashing outwards.

10 43. - Rapid cooling apparatus of packaged beverages according to claim 42 characterized in that the hinge axle (57) of the protection coincides with the axle of the inlets of the rinsing water pipe (2) and of the coolant pipe (6) so that the spray tube can be integral with the protection.

15 44. - Rapid cooling apparatus of packaged beverages according to claims 24 to 43 characterized in that it is part of a refrigerator module (21) contiguous with a freezer module (31), the refrigerator module (21) incorporating an insulating layer (27), as well as having a front opening (33) which gives access to a single tray covered or not by means of a folding lid (20), on which is located the container to be cooled.

20 45. - Rapid cooling apparatus of packaged beverages according to claims 1 and 43, characterized in that it incorporates:

25 - A microprocessor with a program for acquisition, storage and treatment of the variables which intervene in the calculation of the cooling time and controls the activation and operation time of the means of driving liquids and the motor for rotation of the containers, capturing signals from the:

- Keyboard or touch screen;
- Sensor (52) of the brine temperature in the reservoir;
- Sensor of rinsing water temperature in the input pipe;
- Sensor (53) of the brine temperature in spray tube;
- Sensor (60) of the temperature of container to be cooled.

30 46. - Rapid cooling apparatus of packaged beverages according to claim 45 characterized in that the temperature detector of the container to be cooled (60) consists of an infrared temperature sensor.

47. - Rapid cooling apparatus of packaged beverages according to claim 45 characterized in that the temperature detector of the container to be cooled (60) consists of a thermograph camera.

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48. - Rapid cooling apparatus of packaged beverages according to claim 21 characterized in that for the cooling of containers which cannot be rotated an auxiliary recipient is foreseen with one or more bottom outlets to remove the brine at a slower rate than that of the incoming brine from the spray jets.

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49. - Rapid cooling apparatus of packaged beverages according to claims 24 to 48 characterized in that the auxiliary recipient has an upper cover by way of a grating through which the brine can pass retaining the products to be cooled inside the auxiliary recipient.

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50. - Rapid cooling apparatus of packaged beverages according to claims 24 and 48 to 49 characterized in that the auxiliary recipient is divided internally into compartments which are horizontal and/or vertical or in any other direction, to contain foodstuffs in bags for freezing.

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51 - Rapid cooling apparatus of packaged beverages according to claim 24 characterized in that for freezing liquids in the production of domestic ice creams or even crushed-ice beverages the incorporation is foreseen of a recipient inside which is an element for stirring the product to be frozen which receives outwardly over all its surface the coolant brine shower, the stirrer being power driven through an auxiliary output of the movement produced by the motor which drives the rollers.

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52. - Rapid cooling apparatus of packaged beverages according to claim 24 characterized in that for the freezing of packaged beverages the cooling time will be set manually indicating likewise if the container is to be rotated during the process.

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53. - Rapid cooling apparatus of packaged beverages according to

claim 50 characterized in that for the freezing of foodstuffs in bags the cooling time will be set manually.